VEHICLE TECHNOLOGIES OFFICE

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

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Technology Integration Overview

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Technology Integration Overview

Activities

- VT Deployment (Clean Cities) – A voluntary, locally based government/ industry partnership initiative
- Legislative and Rulemaking
- Advanced Vehicle Competitions
- Education Programs
  - Graduate Automotive Technology Education
  - Advanced Electric Drive Vehicle Education Program

Deployment Challenges and Rationale

Deployment efforts accelerate market transformation by increasing public awareness & consumer acceptance/adoption of new vehicle technologies that are being developed through the Vehicle Technologies Office (VTO) R&D activities.

Deployment programs are essential when the success of new technologies depends on consumers changing their driving and purchasing habits.

Primary Focus – Achieve Petroleum Reduction …
by Implementing Next-Steps when R&D is completed

Roughly 10% of VTO base budget supports Deployment (Technology Introduction) efforts

Portfolio of Technologies

Alternative Fuels

Electric Vehicles
Biodiesel
Ethanol
Hydrogen
Propane
Natural Gas

Idle Reduction

Heavy-Duty Trucks
School & Transit Buses
Light-Duty Vehicles

Fuel Economy

More Fuel efficient vehicles, adopting smarter driving and vehicle purchasing habits

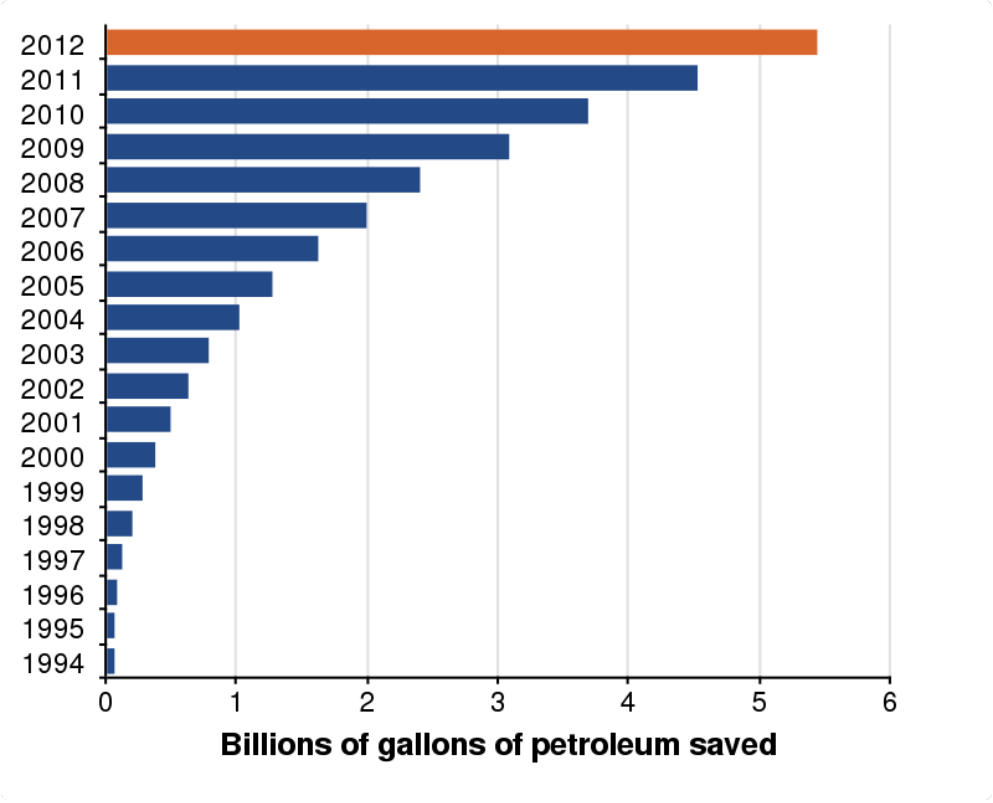
Hybrids

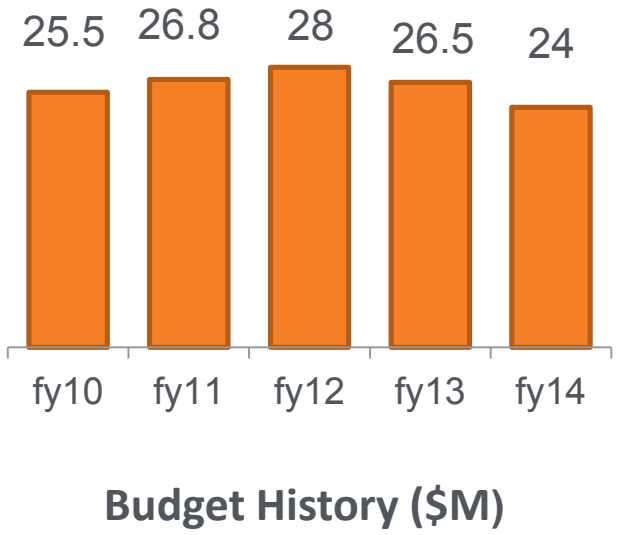
Light- and heavy-duty
Electric hybrids
Plug-In hybrids
Hydraulic hybrids

Progress to date and Long Term Goal

Over 6 Billion Gallons of Petroleum Reduction since 1993

- Over 540,000 AFVs reported on the road in CC territories
- 14,400 alternative fueling and charging stations (CC influenced >70%)
- Long term goal of 2.5B gal/year by 2020





Budget History ($M)

VT Deployment Strategy (leveraging people & resources)

Implement national policies and initiatives by facilitating change on a Local and National basis

Local

Develop a Franchise model (designate CC coalitions) so that approach and message are consistent everywhere, but with attention to local market conditions and priorities (provide strategic direction and comprehensive training to franchisees)

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National

Provide a national unbiased source of info

Provide tools, experts to address barriers and solve problems

Develop Corporate Partnerships with Industry and National Fleets

Increase awareness and publicize success through mass media and outreach

Provide financial assistance to jump start markets and incentivize private investment

(1) Forming Local Community Partnerships

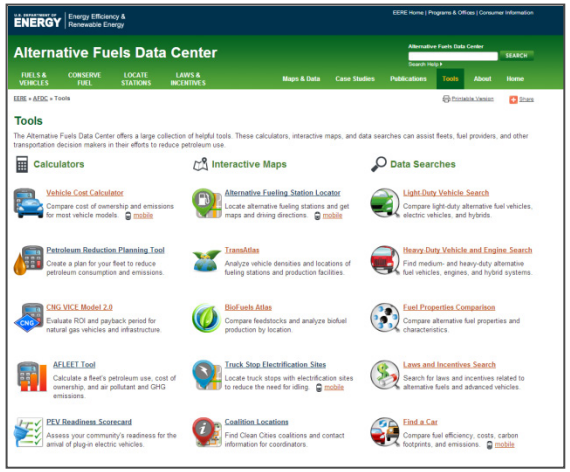
~100 coalitions serving 80% of the US population

Thousands of stakeholders from businesses, city/state governments, transportation industry, community based organizations, utilities and fuel providers

(2) Consumer Information, Outreach, and Education

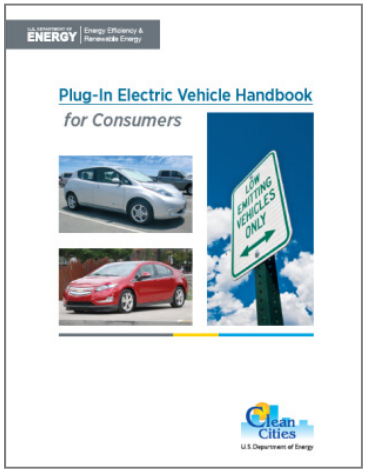
- Non-biased source of VT data and information
- Fuel Economy Guide (FE.gov), Alt-Fuel Data Center (AFDC)
- On-line tools and cost calculators, other web resources
- Fact Sheets, publications, handbooks, success stories
- Technical Response Service and Hotline
- Public workshops, webinars, industry technical conferences

Tech Bulletins



Online Tools

Technical Response Service



Publications

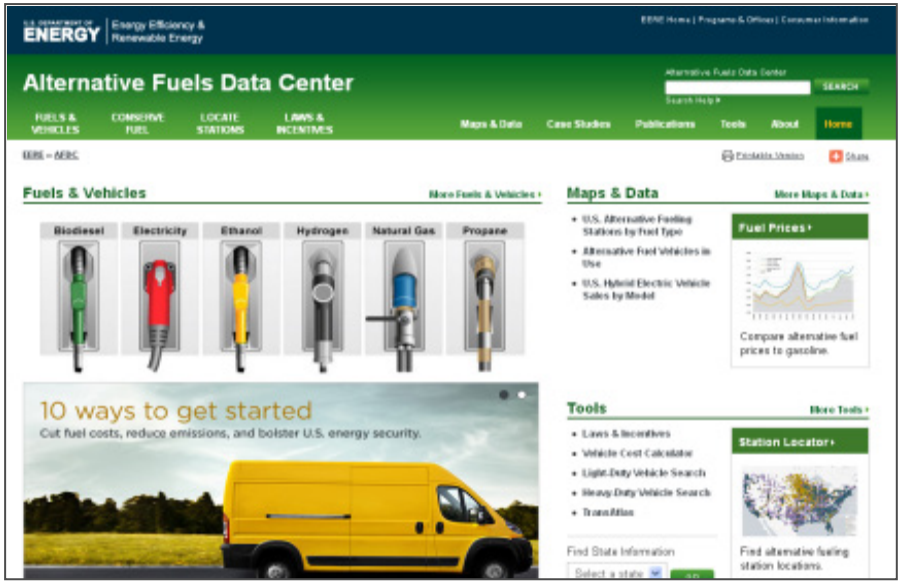
(2) Tools, Publications, Data and Mobile Apps

Fueleconomy.gov

Enables consumers to find the fuel-efficient vehicle that meets their needs, as well as save gas and money with their current vehicles

Alternative Fuels Data Center

Helps fleets choose the right alternative fuel or other petroleum reduction approach for them, with almost 100 case studies and 14 interactive tools



(3) Technical and Problem Solving Assistance

- Capture lessons learned and develop best practices
- Technical Forums and User Groups
- Address unforeseen permitting and safety issues
- Identify chronic vehicle or infrastructure field problems
- Incident investigations (learn from failures)

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Model EVSE Permit

Application for Installation of Electric Vehicle Charging Equipment

NOTICE: The system must be installed in compliance with the National Electric Code® NFPA 70, Article 625 Electric Vehicle Charging System or applicable electrical code currently adopted and enforced within the jurisdiction of installation. All associated work with circuits, electrical service and meters shall be completed in compliance with NFPA 70, national electric code, or applicable electrical code currently adopted and enforced within the jurisdiction of installation.

Section 1: Permit Applicant Information

Name:			
Installation Street Address (P.O. box not acceptable):	Contact Person:		Phone Number: ( ) -
City:	County:	State:	ZIP Code:
Owner Name:	Street Address:		Phone Number: ( ) -
City:	State:		ZIP Code:
Submitter's Name/Company	Street Address:		Phone Number: ( ) -
City:	State:		ZIP Code:
General description of equipment to be installed:			

Section 2: Permit Code Information

Requirements for wiring a charging station are taken directly out of the 2011 edition of the National Electrical Code® (NEC) NFPA 70, Article 625 Electric Vehicle Charging System. This article does not provide all of the information necessary for the installation of electric vehicle charging equipment. Please refer to the current edition of the electrical code adopted by the local jurisdiction for additional installation requirements. Reference to the 2011 NEC may be made at www.nfpa.org/70.

NEC® Chapter or Article	DESCRIPTION
Chapter 2 and 3	**Branch Circuit** A new electrical box added on a branch circuit shall comply with NFPA 70 National Electrical Code® Chapter 2 Wiring and Protection and Chapter 3 Wiring Methods and Materials and all administrative requirements of the NEC or the electrical code in effect in the jurisdiction
625.4	**VOLTAGES** Unless other Voltages are specified, the nominal ac system voltages of 120, 120/240, 208Y/120, 240, 480Y/277, 480, 600Y/347, and 600 Volts shall be used to supply equipment
625.5	**LISTED OR LABELED** All electrical materials, devices, fittings, and associated equipment shall be listed or labeled.

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(4) Competitively-Awarded Financial Assistance:

Encourages private sector match and long-term investment

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Recent Awards – ($11.1M) 20 Clean Cities Alternative Fuel Vehicle deployment projects across 32 states and DC (Community based initiatives that will address barriers, implement policies, and streamline deployment of AFVs). These projects are being presented & reviewed at the AMR this week on Thursday-Friday)

Future Directions – Notice of Intent issued this spring for a potential FY-2014 funding opportunity related Alternative-Fuel deployment efforts. Topics included:

- Incorporating Alternative Fuels into Emergency Response and Preparedness Operations
- Alternative Fuel Training for First Responders, Public Safety Officials, and Critical Service Providers
- Alternative Fuel Vehicle Demonstration and Enhanced Driver Experience Projects

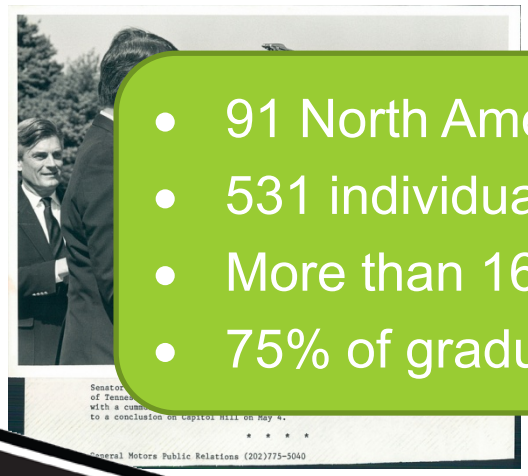
Clean Cities 2013 Notable Accomplishments

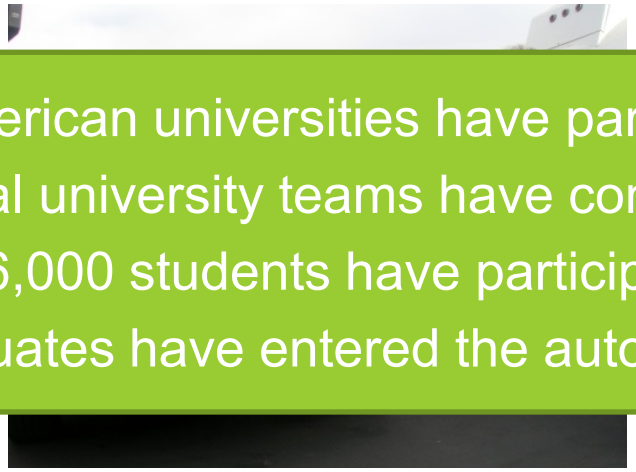
- Celebrated 20th Anniversary as a national deployment program
  - Grown to ~100 coalitions covering ~80% of US population
- FuelEconomy.gov now provides 30 years of vehicle data and has surpassed 300M users; introduced Used Car label
- National Clean Fleet Partners has grown to include 23 large companies. Major announcements included:
  - **Enterprise Holdings** – 21 of their car rental locations now offer PEVs and 80% of their 500 airport shuttle buses are now powered by alt-fuels
  - **AT&T** – Deployed their 8000th CNG vehicle as part of their plan to place 15,000 AFVs in service by 2018
  - **United Parcel Service** – Announced plans to deploy 1000 propane delivery trucks and build 50 propane fueling stations
- EV Scorecard tool released by OMB for rollout to thousands of communities, along with PEV Readiness Guide and Lesson Learned

Training the Next Generation of Engineers

Provide a new generation of engineers with knowledge and skills in developing and commercializing advanced automotive technologies.

26 years of university-level advanced vehicle technology competitions!





- 91 North American universities have participated since 1989
- 531 individual university teams have competed
- More than 16,000 students have participated
- 75% of graduates have entered the automotive industry

1988–1990 > Methanol Marathon
1990–1993 > Natural Gas Vehicle Challenge
1992–1995 > HEV Challenge
1995–1997 > Propane Vehicle Challenge
1995–1999 > FutureCar Challenge
1997–1999 > Ethanol Vehicle Challenge
1999–2004 > FutureTruck
2004–2008 > Challenge X: Crossover to Sustainable Mobility
2008–2011 > EcoCAR: The NeXt Challenge
2011–2014 > EcoCAR 2: Plugging In to the Future

EcoCAR 2: Plugging into the Future … Crosses the Finish Line!

Student built vehicles are dynamically and statically evaluated at Milford Proving Ground during the third and final year of EcoCAR 2.

EcoCAR 2: Plugging into the Future … Crosses the Finish Line!

DOE's Next Advanced Vehicle Technology Competition Series

EcoCAR 3
Advanced Vehicle Technology Competition

- DOE is teaming with General Motors and other industry sponsors for EcoCAR 3.

16 North American Universities selected to participate.

Arizona State University
California State University – Los Angeles
Colorado State University
Embry-Riddle Aeronautical University
Georgia Institute of Technology
McMaster University
Mississippi State University
Ohio State University
Pennsylvania State University
University of Tennessee, Knoxville
University of Alabama
University of Washington
University of Waterloo
Virginia Tech
Wayne State University
West Virginia University

EcoCAR 3

- 4 year competition (2014 – 2018)
- based on a real-world vehicle design process.
- Teams will be challenged to reduce the environmental impact of a GM-donated vehicle by minimizing the vehicle's fuel consumption and reducing its emissions.
- Consider cost and explore innovation.
- All while retaining the vehicle's performance, safety, and consumer appeal.

The Chevrolet Camaro, donated by General Motors, as the integration platform for student advanced vehicle designs.

Training the Next Generation

Graduate Automotive Technology Education

- Receive DOE funding for student fellowships and curriculum development.
- Each center has established a graduate engineering education program that offers courses emphasizing that center's technology specialty.
- **In 2011, 7 GATE Centers awarded - $6.4 million (DOE) over 5 years**
- Focus on three critical automotive technology areas: hybrid propulsion, energy storage, and lightweight materials.

Seven Centers of Excellence Awarded in 2011

- The Ohio State University - **Energy Storage and Hybrid Propulsion**
- University of Michigan, Dearborn - **Hybrid Propulsion**
- University of Colorado, Colorado Springs (UCCS) and the University of Colorado, Boulder (CU-Boulder) - **Energy Storage and Hybrid Propulsion**
- Purdue University -**Hybrid Propulsion with emphasis on Medium/Heavy Duty**
- Clemson University - **Hybrid Propulsion**
- Pennsylvania State University - **Energy Storage**
- University of Alabama, Birmingham - **Lightweight Materials**

Advanced Electric Drive Vehicle Education Program

Accelerate the development and production of various electric drive vehicle systems through support of educational programs to substantially reduce petroleum consumption.

- 10 projects selected in 2009 focused on:
  - Engineering Degree & Certificate Programs
  - Emergency Responder and Safety Training
  - Consumer & K-12 Educational Outreach
  - Developing and Providing Teaching Materials
  - Training Service Personnel, Vehicle Mechanics, and Supporting Infrastructure

- National Fire Protection Association
- Missouri University of Science and Technology
- Wayne State University
- West Virginia University
- University of Michigan
- J. Sergeant Reynolds Community College
- Michigan Technical University
- Purdue University
- City College of San Francisco
- Colorado State University

Contact Information

www.vehicles.energy.gov

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Vehicle Education

Legislative & Rulemaking

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